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A. RICHARD PARK, REG. NO. 41241
PARK, VAUGHAN & FLEMING LLP
2820 FIFTH STREET
DAVIS, CA 95616

EXAMINER

ALI, SYED J

ART UNIT

PAPER NUMBER

2195

DATE MAILED: 06/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/884,291

Applicant(s)

CZAJKOWSKI ET AL.

Examiner

Syed J. Ali

Art Unit

2195

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 May 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on March 29, 2005 has been entered. Claims 1-21 are presented for examination.

2. The text of those sections of Title 35, U.S. code not included in this office action can be found in a prior office action.

Claim Rejections - 35 USC § 103

3. Claims 1-3, 8-10, and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haggar et al. (US 2002/0091904) (hereinafter Haggar) in view of Shaylor (US 2002/0108025).

4. As per claim 1, Haggar teaches the invention as claimed, including a method for managing surplus heap memory in a multitasking system, comprising:

reserving a guaranteed amount of heap memory for a task from a common heap in the multitasking system (paragraph 0006);

receiving a request from the task to allocate heap memory for a new object (paragraphs 0006-0009, 0023, 0033); and

if heap memory is available in the guaranteed amount of heap memory for the task, allocating heap memory for the new object from the guaranteed amount of heap memory (paragraph 0007, 0033);

otherwise, if surplus heap memory is available in the common heap in addition to heap memory allocated to tasks, reserving an additional amount of heap memory to the task from the common heap (paragraph 0007, 0034-0035), and

allocating heap memory for the new object from the additional amount of heap memory, whereby allocating heap memory for the new object from the additional amount of heap memory delays garbage collection (paragraphs 0007, 0034-0035).

5. Shaylor teaches the invention as claimed, wherein the heap memory reserved for a task is separate from heap memory reserved for all other tasks in the common heap of a multitasking system (paragraphs 0035-0036).

6. Haggar discusses dynamically increasing the size of a memory heap in response to a request from a program that exceeds the available memory. This provides benefits in terms of delaying garbage collection and increasing the processing efficiency of the computer. Shaylor provides an improvement upon this memory allocation scheme by allocating a separate portion of physical memory for each task (paragraphs 0035-0036) and dynamically increasing the size of the allocated memory while a task is executing (paragraph 0038). It would have been obvious to one of ordinary skill in the art to combine Haggar and Shaylor since both address the deficiencies of known dynamic memory allocation methods. Both seek to provide a way of allocating memory to virtual machines to accommodate memory requests at runtime, where virtual machine tasks tend to have changing memory requirements over the course of execution.

7. As per claim 2, Hagggar teaches the invention as claimed, including the method of claim 1, wherein if surplus heap memory is not available in the common heap in addition to heap memory allocated to tasks, the method further comprises:

performing garbage collection on heap memory to reclaim unused reserved heap memory (paragraph 0024, 0039), and

allocating heap memory for the new object from reclaimed surplus heap memory (paragraph 0024, 0039).

8. As per claim 3, Hagggar teaches the invention as claimed, including the method of claim 1, wherein reserving the guaranteed amount of heap memory from the common heap includes:

determining if there is sufficient heap memory available in the common heap (paragraphs 0033, 0039); and

if not, performing garbage collection to reclaim allocated surplus heap memory (paragraph 0024, 0039), and

reserving heap memory for the task from reclaimed heap memory (paragraph 0024, 0039).

9. As per claims 8-10, Hagggar teaches the invention as claimed, including a computer-readable storage medium storing instructions that when executed by a computer causes the computer to perform the method of claims 1-3, respectively (Fig. 2).

Art Unit: 2195

10. As per claims 15-17, Haggar teaches the invention as claimed, including an apparatus that facilitates managing surplus computer heap memory in a multitasking system comprising the method of claims 1-3, respectively (Fig. 2).

11. Claims 4-7, 11-14, and 18-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haggar in view Shaylor in view of Otis (US 2002/0099765).

12. As per claim 4, Otis teaches the invention as claimed, including the method of claim 1, wherein heap memory in the common heap is managed using a generational garbage collector (paragraph 0048).

13. It would have been obvious to one of ordinary skill in the art to combine Haggar, Shaylor, and Otis since a generational memory organization and garbage collector allows objects that are commonly referenced to have a more permanent position in the memory. Those objects that are not referenced often are the first to be reclaimed, thereby decreasing the overall computation cost associated with garbage collection (Otis, paragraph 0008). Additionally, Haggar indicates that any garbage collection technique may be used to manage the memory or detect unused heap memory (Haggard, paragraph 0040).

14. As per claim 5, Otis teaches the invention as claimed, including the method of claim 4, wherein a plurality of tasks share an old generation of the generational garbage collector (paragraphs 0049, 0052).

Art Unit: 2195

15. As per claim 6, Otis teaches the invention as claimed, including the method of claim 5, wherein each task of the plurality of tasks has a new generation of the generational garbage collector belonging to the task (paragraphs 0052-0053).

16. As per claim 7, Otis teaches the invention as claimed, including the method of claim 4, wherein the generational garbage collector is a copying garbage collector (paragraphs 0055, 0060).

17. As per claims 11-14, Haggar teaches the invention as claimed, including a computer-readable storage medium storing instructions that when executed by a computer causes the computer to perform the method of claims 4-7, respectively (Fig. 2).

18. As per claims 18-21, Haggar teaches the invention as claimed, including an apparatus that facilitates managing surplus computer heap memory in a multitasking system comprising the method of claims 4-7, respectively (Fig. 2).

Response to Arguments

19. **Applicant's arguments filed March 29, 2005 have been fully considered but they are not persuasive.**

20. Applicant argues that the combination of Haggar and Shaylor fails to read on the claims because Applicant's invention "*uses a common heap in which the heap memory allocated to*

Art Unit: 2195

each task is separate from the heap memory allocated to all other tasks.” Applicant adds, “[t]here is nothing within Haggar or Shaylor, either separately or in concert, which suggests using a common heap in which the heap memory is allocated to each task is separate from the heap memory allocated to all other tasks.”

21. Examiner respectfully disagrees. Applicant’s suggestion that the combination of Haggar and Shaylor does not relate to allocation of heap memory is incorrect, as is the assertion that the combination fails to indicate separate memory allocations for each task. Haggar is clearly associated with allocating separate storage blocks of heap memory from a common heap (paragraph 0017, 0023, 0025). Haggar allocates memory separately for each program or application, which slightly differs from allocating memory for each task (though an application may be considered a task in some cases, e.g. a single-threaded application). Despite this discrepancy between Haggar and the claimed invention, Haggar also provides for allocating separate blocks of memory in other ways that are not explicitly discussed (paragraph 0017, “the present invention...is applicable in general to a memory pool in which storage blocks are separately allocated from a plurality of sub-pools that are defined or provided within the memory pool.”) From this suggestion of a possible modification in Haggar, it is obvious to look to Shaylor, which discusses at length the benefits of allocating separate address spaces to separate tasks, particularly when trying to reduce the frequency of garbage collection, a problem both Haggar and Shaylor are concerned with.

Art Unit: 2195

Conclusion


22. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Syed J Ali whose telephone number is (571) 272-3769. The examiner can normally be reached on Mon-Fri 8-5:30, 2nd Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai T An can be reached on (571) 272-3756. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Syed Ali
June 2, 2005



MENG-AI T. AN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2109